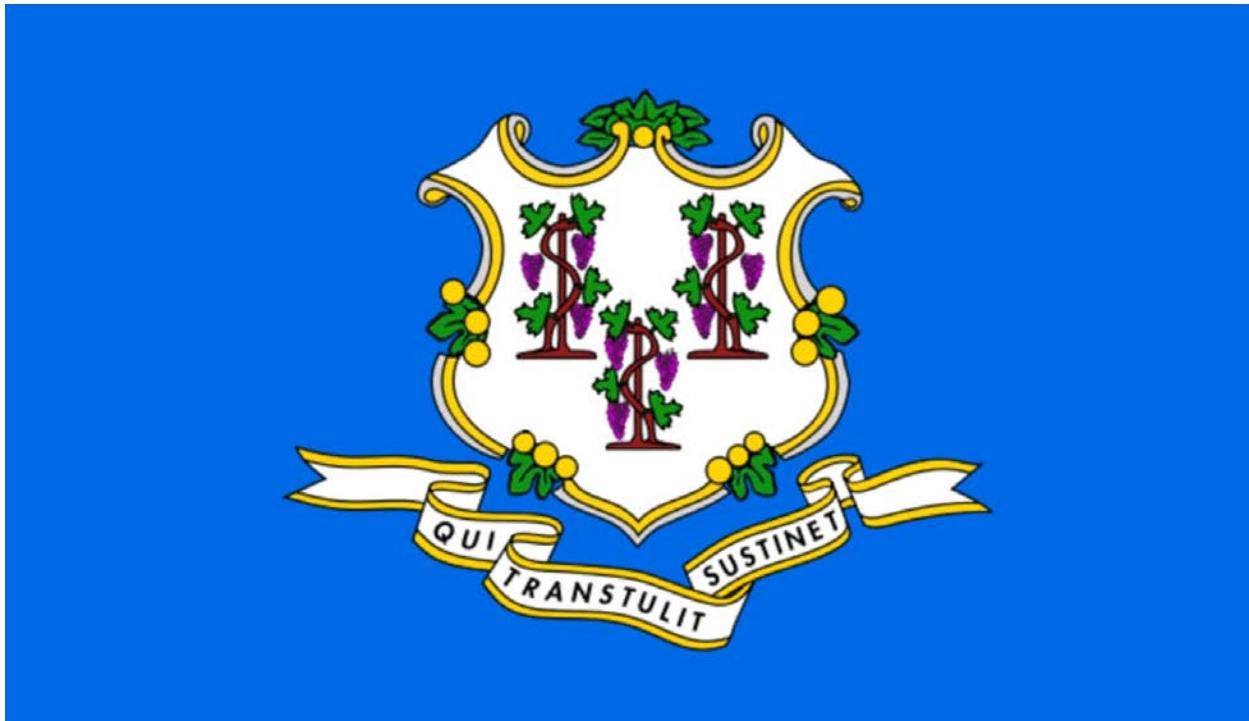


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# **Connecticut October 2011 Snowstorm Power Restoration Report**



Prepared by:  
Witt Associates  
December 1, 2011

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**WITT**  
ASSOCIATES

## ***About Witt Associates:***

Witt Associates is a public safety and crisis management consulting firm based in Washington, D.C., with consultants located throughout the country. Witt Associates has unrivaled experience and hands-on knowledge of emergency preparedness, response, recovery, and mitigation. Witt Associates bridges government agencies and non-profits with industry and citizens as they assist state and local governments to prepare for and recover from disasters and crisis.

Witt Associates is uniquely positioned to bring together policy architects and technical experts in public safety, with leaders from all levels of government and private sector partners to forge solutions to emergency management challenges.

Our team includes seasoned crisis and emergency management leaders with significant experience to provide consultation on key issues of public safety. The team is proficient in the details of emergency management, committed to the responsibility of the profession, and understands how crisis and emergency management work fits into a larger political and social climate.

## ***Disclaimer and Disclosure:***

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# Connecticut October 2011 Snowstorm Power Restoration

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# I. Executive Summary

The northeastern United States was struck by an unusual pre-Halloween snowstorm on October 29, 2011. The wet snow – more than 12 inches in some areas -- stuck to the still leaf-laden trees bringing down limbs, branches and, in some cases, full trees. Fallen trees caused substantial damage to power lines, including some transmission lines, and blocked roads. More than 3 million electric utility customers lost power in the region. Eight deaths related to the snowstorm were reported in Connecticut. The snowstorm and power outage resulted in significant economic losses in Connecticut.

North Central Connecticut was hit especially hard, challenging the capabilities and coordination of electricity providers and public sector response. Almost 70 percent of Connecticut Light and Power's (CL&P) 1.2 million customers, lost power. Customers of The United Illuminating Company (UI), serving the coastal area, were not hit as hard, with a total of 52,000 of its 350,000 customers affected at some time during the outage.

This *Connecticut October 2011 Snowstorm Power Restoration Report* provides an independent assessment of the preparedness, response, and restoration efforts and offers recommendations for how capabilities to address such events can be improved.

The October 2011 snowstorm resulted in 809,097 CL&P customers being without power at some time during the 11-day outage; many suffered multiple outages. The duration of the power outage in some of the most heavily impacted areas caused inconvenience and frustration among the public and municipal officials. Community frustration was exacerbated by CL&P's communications with the general public and state and local officials.

This report provides a brief summary of the outage event, describes the methodology used to create this expedited evaluation, and presents key findings and recommendations for improving power restoration response. It is intended to provide a basis for further examination of key issues and improvement planning by the state, municipalities and utility providers. Although the performance of both CL&P and UI were reviewed and summarized here, the primary focus of this effort is on the CL&P service territory.

The October snowstorm resulted in the largest restoration effort in CL&P's history. Despite the length and extent of the service outages, and the effect on customers in the affected service areas, there were successes in CL&P's power restoration effort. The company's internal forecast model accurately predicted power would be fully restored by Wednesday, November 9, although an unprecedented army of mutual aid workers from other utilities was required to do so. No serious injuries or deaths were reported associated with the restoration effort. Municipalities reported that power restoration crews, once they arrived in their communities, generally functioned well and efficiently. Stakeholders also praised the assistance from power company customer service representatives in answering phone lines in a timely fashion, with an average wait time of less than

45 seconds;<sup>1</sup> this is frequently not the case in such a wide-scale event. CL&P's recently created Town Liaison program, while not completely successful in its implementation, is recognized as positive in concept.

UI outages were smaller in number and in proportion to their total customers. After the October snowstorm, all UI customers were restored by the night of Wednesday, November 2.

## **Summary of Issues**

Findings and recommendations in this report address a number of issue areas:

- CL&P was not prepared for an event of this size. The worst-case scenario in the company's emergency response plan considered outages over 100,000 customers, or less than 10 percent of their total customer base. More than two-thirds of its customers lost power as a result of the October snowstorm.
- Preparedness, including planning, training, and exercise, for a widespread power outage and/or infrastructure damage event is inadequate across all sectors.
- CL&P did not lean forward by pre-staging adequate restoration resources in advance of the October 29 snowstorm; this delayed the recovery effort in the first days.
- As is the case with most electric utilities, CL&P is dependent on contractors and mutual aid from other utilities to address a large-scale outage. Several factors contributed to initial delays in auxiliary staffing for this event. The company was able to almost fully restore power by Wednesday, November 9, by bringing in thousands of crews later in the event.
- CL&P developed an internal stretch goal to restore power to 99 percent of all customers by Sunday, November 6. Without vetting internally, the company announced this date as a public performance commitment. This announcement, and a subsequent commitment to restore 99 percent of all customers in each of 149 municipalities by November 6, unnecessarily contributed to increased customer frustration and challenges for municipal governments.
- Northeast Utilities (NU), CL&P's parent company, did not provide sufficient executive leadership during this restoration effort, allowing one individual to oversee the restoration effort, serve as the primary liaison at the state Emergency Operations Center, and be the public spokesperson.
- When power was restored for individual customers, CL&P's real-time situational awareness and ability to communicate restoration status to customers, was delayed by as much as 12 hours as data was not updated in the system until crews returned from their shifts. This hampered coordinated decision-making and accurate communication regarding power restoration activities.
- Although a good idea in concept, CL&P's Town Liaison program had not been fully developed at the time of the snowstorm and was not consistently effective in providing

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<sup>1</sup> CL&P Internal Communications Report, November 9, 2011

- a conduit for accurate information between the company and municipal governments, and, in some cases, undermined the company's credibility with local officials.
- CL&P crews and public sector response and emergency management entities in Connecticut generally use radio systems for response communication in the field that are not compatible with each other.
- While vital to provide needed capabilities, use of external mutual assistance and contract crews presents communication, reporting, and tracking challenges because they often do not have the same communications or field reporting technology as used by local crews.

## **Overview of Recommendations**

The 27 recommendations found in this report can be categorized in several broad themes:

- CL&P should improve its planning, procedures, training, and pre-staging practices to adequately prepare its crews and resources for the scale of incidents it and its customers potentially face by significantly increasing the scale of planning scenarios.
- CL&P needs to develop its management scalability for large-scale incidents by implementing an Incident Command System (ICS) structure that expands with the requirements of the incident.
- CL&P needs to improve its processes for information management, including message vetting, communication, and coordination with local governments, and the dissemination of public information to its customers, external partners, stakeholders, and the media. During a large-scale outage, it can be as important to communicate the restoration plan and progress toward implementation of that plan, as it is to restore power itself.
- CL&P should more closely coordinate and integrate preparedness activities with state and local governments to include ongoing planning, training, and exercise for utility disruption.
- State and local government planning and preparedness should address major power disruption more comprehensively and inclusively, including coordination with utility providers and procedures for damage assessment teams in power and/or utility outage events.

As noted above, the scope of this expedited high-level review is limited to the restoration effort itself. There are several other factors that impact the scale of outages during a major event including system design, hardening, vegetation management, and regulatory issues. We recommend further review of these and other issues.

This review was conducted under extraordinary circumstances; the restoration effort was still ongoing when interviews were conducted. We want to thank the state, local, utility, and labor officials who cooperated in this review. Finally, we want to thank the thousands of workers who cleared the roads and restored the power for individual citizens, their schools, businesses, and

communities. This review appropriately focuses on opportunities for improvement, but we should not overlook the millions of actions that were performed well.

## II. Scope and Methodology

### A. Scope

The State of Connecticut retained Witt Associates to provide an independent assessment of preparedness, response, and restoration efforts associated with the snowstorm that occurred October 29-30, 2011.

The focus of this assessment is the performance of private utility providers and local and state public sector entities responsible for (1) restoration of electric power transmission and distribution, and (2) emergency preparedness and response related to widespread power outages. This assessment presents an objective and informative identification of problem areas along with recommendations for improvement.

### B. Methodology

This assessment is an expedited, high-level report that addresses issues associated with the restoration of power after the October 29, 2011, snowstorm. The assessment included a series of activities in a compressed time frame (November 7 to December 1):

- project initiation and objective setting
- data collection, including document review and analysis
- interviews with local elected officials, as well as public safety, emergency management, public works, and transportation officials and interviews with state agency personnel
- interviews with utility officials
- interviews with labor officials
- assessment report development

In setting the aggressive timeline for the report, Governor Dannel P. Malloy noted the need for expedited review. The report was developed using qualitative and expert analysis of input from individuals in responsible positions in the private and public sectors, as well as document review.

The consultant team reviewed documents relevant to the incident, including but not limited to:

- utility and government emergency response plans
- evaluations of recent power outage events including the March 2010 severe weather and Hurricane Irene (August 2011)
- snowstorm event summaries and response timelines
- weather forecasts
- CL&P and UI presentations to the State Team Organized for the Review of Management of Irene (STORM) Panel and Two STORM Panel
- coverage and outage maps

- utility company mutual aid agreements;
- staffing data and related information providing by CL&P
- press releases
- other documents

(A list of documents reviewed is provided in Appendix B.)

Witt Associates conducted a series of interviews, asking standardized questions to focus the interviews on factors related to power restoration and emergency response, and to provide consistency across interviewers and participants. In addition to directed questions, interviewees also were asked open-ended questions to allow for discussion of the issues and recommendations most relevant or important to their jurisdiction or organization. The team conducted more than 65 interviews with local and state government representatives and executives, operational staff, communications staff, and other personnel from CL&P and UI. A list of interview participants is found in Appendix A.

To analyze the information available, the consultant team applied its expertise in the field of emergency preparedness, response, recovery, and mitigation as well as electric utility operations and restoration. The team also referenced findings and recommendations from previous incident assessment reports. Findings and recommendations contained in this report have been vetted and validated by members of the consultant team, including utility subject-matter experts.

When asked to conduct reviews such as this, Witt Associates finds it effective and helpful for the client to focus on areas that offer the greatest potential for improving future performance. This methodology can have the effect of emphasizing challenges and other negative issues. However, Witt Associates also recognizes strengths and successes in the response and has sought to note effective action where appropriate.

## C. Acknowledgements

Witt Associates acknowledges the assistance of local and state officials, CL&P and UI officials, labor and others in providing access and information in a timely manner. The consultant team appreciates the time and valuable input of the individuals interviewed for the assessment, who were forthcoming and thoughtful in the information and opinions they provided, despite in most cases having just experienced a long and difficult snowstorm response and power restoration. Witt Associates would like to emphasize the extraordinary actions and efforts of those involved in the power restoration effort in both the public and private sectors, including line crews, public works personnel, and utility company and government emergency management staff. They worked diligently, many in hazardous or challenging conditions, to return Connecticut's communities back to normal operations in what was the largest power outage event in the state's history. Many individuals performed as best they could in adverse circumstances.

### III. Summary of Events

The northeastern United States, including the State of Connecticut, experienced an early season snowstorm on October 29-30, 2011, that resulted in more than 809,097 individual CL&P customers<sup>2</sup> without power at some time (807,228 at the peak of the outage), a portion of whom remained without power for a week to 11 days. Peak outages in UI's service area were approximately 19,000, and total outages 52,000<sup>3</sup>. While the region is accustomed to significant winter snowfall, the snowstorm dumped 12 inches or more of wet, heavy snow on parts of Connecticut and its neighboring states at a time when foliage remained on many trees. As a result, the snowstorm caused major damage to trees and power lines, blocking roads and creating widespread power outages. Eight snowstorm-related fatalities were reported. The snowstorm and power outage resulted in significant economic impacts in the state, including response and debris removal costs and lost business days.

#### Predictions for Early Snow

Weather forecasts for Connecticut at midweek before the storm warned of the potential for heavy, wet snow. By Friday morning, October 28, weather subscription services were issuing winter weather alerts, with forecasts predicting up to eight inches of snow beginning on Saturday afternoon, October 29. The Connecticut Department of Emergency Services and Public Protection sent notices of weather forecasts to local governments and others (see Appendix C), and its Department of Emergency Management and Homeland Security (DEMHS) communicated with local governments and utilities including electric power and some telecommunications providers. On Friday DEMHS began holding Unified Command conference calls or meetings, which included utility representatives, as well as conference calls with municipalities. Some local governments began preparing public works and snow removal crews for the weekend's work.

The two private electricity providers<sup>4</sup> in the state, CL&P, a subsidiary of Northeast Utilities, and UI, began placing crews on standby Friday morning, October 28. In addition, CL&P pre-positioned 30 contractors who had been working on transmission lines for anticipated distribution line damage. According to CL&P, this was the first time in its history crews had been pre-positioned. CL&P

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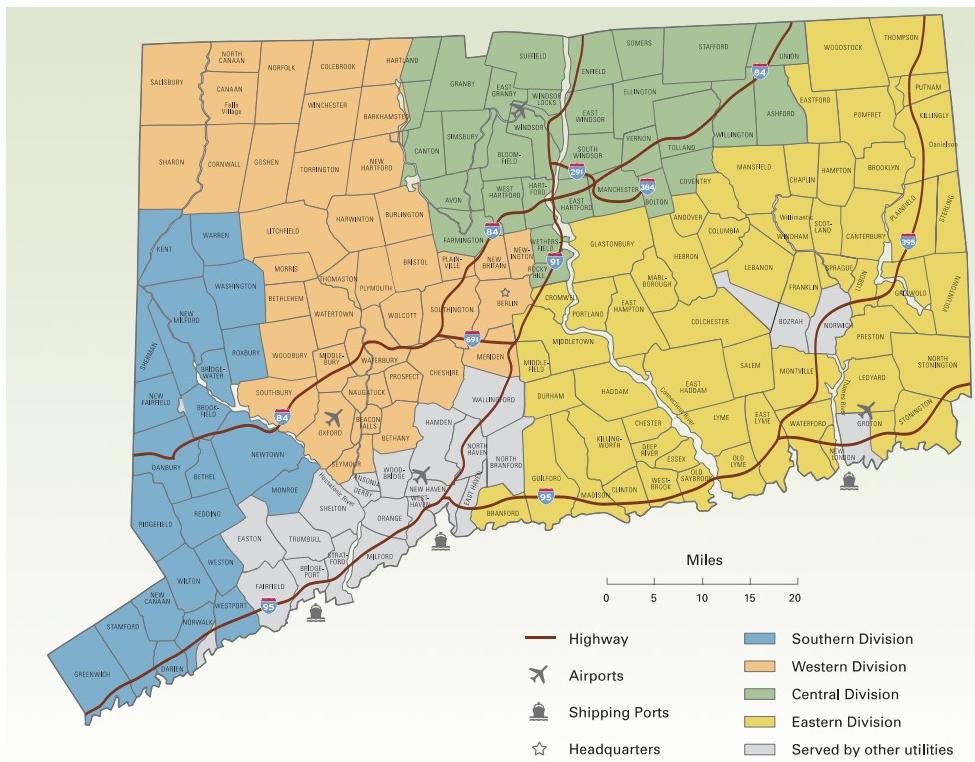
<sup>2</sup> A customer is defined based on meters and billing; it can be a residence housing one individual or a family, an apartment complex housing several families, or an individual business or multiple facilities under one account. In general, the number of individual persons affected by a large-scale power outage exceeds the number of utility customers.

<sup>3</sup> For comparison, in a total service area of approximately 350,000, during Irene UI had a peak of 158,000 customers out, and a total of 201,000.

<sup>4</sup> Two towns are served by Norwich's municipal utility.

provides electricity to approximately 1.2 million customers, with UI serving approximately 350,000 customers, primarily in south-central and southwestern coastal areas of Connecticut.

**Figure 1. CL&P Coverage Area**



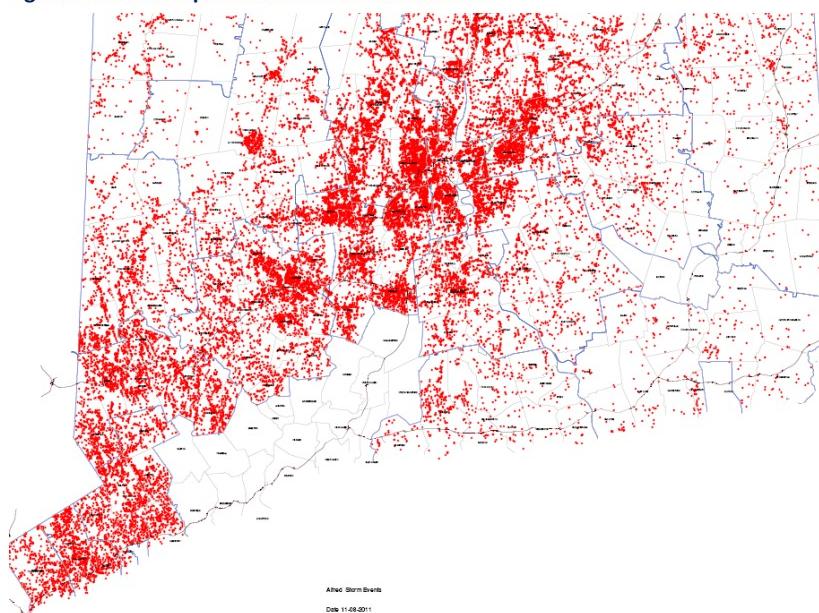
## Cracking Branches, Widespread Power Outage

Although snow had not been forecast to begin falling until the afternoon of Saturday, October 29, it began before noon on Saturday, becoming heavy by midday, and continuing through Sunday. By the overnight hours on Saturday, the heavy snow began taking its toll on trees, with limbs sagging and breaking – issuing loud cracks heard in many neighborhoods – and taking out power lines and poles as they fell. A state that only two months prior had experienced record power outages because of Hurricane Irene (August 28, 2011) was about to experience another major power emergency, and this one would prove to be far worse.

Much of the state was impacted by the power outage; hardest hit areas included the north central part of the state, including the Farmington Valley. CL&P reports indicated a total of approximately 25,000 “trouble spots”<sup>5</sup>. This is the highest number in CL&P’s history. (See Figure 1.)

<sup>5</sup> A trouble spot is a location where there is damage to electrical transmission / distribution system components requiring crew response to make conditions safe for the public, repair damage, and restore power.

**Figure 2. Trouble Spots from October Snowstorm**



#### **CL&P Trouble Spots From October Snowstorm**

- ~25,500 trouble spots (almost 60% more than Irene); repaired over 11 days
- CL&P estimated 205,000 crew hours of restoration work during incident
- Most significant damage experienced in north-central portion of state

*Source: CL&P Report to Two STORM Panel*

In heavily impacted locations, the severity and breadth of damage from the snowstorm created challenges for municipalities' tree- and road-clearing crews and CL&P's restoration operations. There were thousands of locations of downed trees and power lines, and in many cases, this resulted in challenges related to making sure that downed lines were not live – “cut, clear and make safe” in power company terminology – before local public works crews could remove trees and clear roads.

Interviews with CL&P personnel indicated the company devoted its resources heavily to cut, clear, and make-safe operations for the first three days following the storm, and it attempted to deploy at least one crew to each town in its service area to support this. As a result, a full focus on actual power restoration did not begin until Wednesday, November 2, according to an interview with CL&P systems operations management. In addition, getting from place to place was difficult because of the number of roads blocked by downed trees and, often, power lines. Areas served by UI were less severely impacted. A total of 52,000 UI customers lost power (with a peak of 19,000 outages at one time). All UI service was restored by the close of Wednesday, November 2.

### **Projecting and Communicating Restoration Times**

Early in the outage, CL&P officials, using outage reports and computer models designed for planning power-restoration activities, projected Wednesday, November 9, as the date for full restoration to all customers. However, as customers complained about the length of time without electricity, CL&P set an aggressive internal goal – based on the restoration curve projected by its restoration model – to restore 99 percent of its customers who were without power by midnight Sunday, November 6. Although not vetted internally, this internal target was communicated to the public through statements to the media on November 1.

On November 4, CL&P's president and chief operating officer reiterated the target but stated more specifically that all of the municipalities served by CL&P would be 99 percent restored by midnight Sunday. This is numerically different and was a more difficult goal than the general 99 percent target. Some CL&P liaisons assigned to the most affected towns were skeptical that each town could be restored to 99 percent by Sunday, although they typically maintained unity of message in their communications.

When this projection, which had been viewed as a promise by both customers and towns, was not met, customers and local officials in towns still below 99 percent were frustrated. Through these statements, CL&P created unnecessary expectations on the part of customers and their elected officials, resulting in cynicism regarding power company operations and statements and adding to anger about the duration of the outage.

A recently implemented Town Liaison program, through which CL&P placed liaisons with each municipality during the outage, had mixed results. In some towns, liaisons communicated reliable information between CL&P operations and the towns. In others, however, the presence of liaisons raised municipal officials' expectations of communication and coordination, and the assigned liaisons were not sufficiently integrated with restoration operations to meet these expectations.

## **Frustration**

Local government officials and residents in towns that still had power outages were frustrated by the uncertainty regarding the time by which power would be restored, which challenged planning for shelter operations, continuity operations, and emergency and human services. Some town officials were told they would get power crews in their area on specific days and the crews did not appear. Municipal emergency officials communicated damage assessments and top priorities for restoration through their CL&P town liaison; however, many reported delays in addressing their priorities, and they described a failure on CL&P's part to explain these delays.

## **CL&P's Restoration Effort**

A new CL&P Emergency Plan (June 2011) was in place, but many corrective actions identified in the intervening Hurricane Irene outage had not yet been implemented. Because of the recency of the plan update, the company had not had time to engage in significant training or exercise of the new version of the plan.

CL&P, which served most of the outage area, brought in contract and mutual aid crews from other states and Canadian provinces. Both CL&P and UI are members of the Northeast Mutual Assistance Group (NEMAG), a collection of northeastern electricity providers that have an agreement under which they can send resources to assist in another state in power emergencies. CL&P also is a member of the New York Mutual Assistance Group (NYMAG). CL&P called up some contract crews on Friday, October 29, and requested mutual assistance crews on Saturday, about the same time as

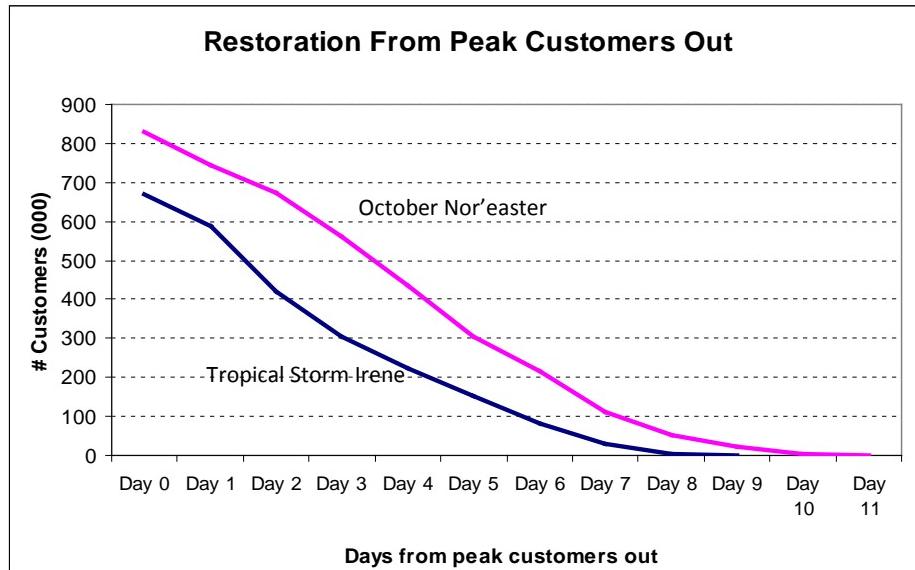
other companies in the region also identified the need for mutual assistance. Prior to the snow starting, states in the region were not releasing crews.

CL&P reported delays in some mutual assistance reaching the state, which was likely complicated by the regional nature of the incident and competition for resources (multiple nearby states were also affected). CL&P reported the number of tree, line, and service crews that worked in the restoration effort totaled 2,917 (internal and external)<sup>6</sup>.

Restoration involved addressing transmission backbone and infrastructure damage as well as distribution lines. It is unusual to lose transmission lines as trees are cleared to provide much wider right-of-ways; but in several cases, the weight of the snow brought down full trees onto transmission lines. In some areas, portions of the system had to be rebuilt.

**Figure 3. Restoration Curve**

Source: CL&P Presentation to Two STORM Panel, November 15, 2011



Gradually, power was restored to the 149 municipalities without power; the 99 percent overall restoration benchmark was reached shortly after the original projection date of Sunday, November 6 (though not for every town). The last CL&P customers to be brought back online were restored on November 9, as the company's model had initially predicted. Restoration of more than 809,000 outages in 11 days is not inconsistent with industry benchmarks. However, there are factors that could have reduced the time required for restoration.

While the power outage was widespread and challenging, it is noted that there were no fatalities or major injuries reported at the time of this report associated with either CL&P or UI's restoration efforts.

<sup>6</sup> CL&P Presentation to Two STORM Panel, November 15, 2011.

## **Evaluating the Response**

Governor Dannel P. Malloy requested an emergency declaration for affected areas of the state, which President Barack Obama approved on October 31, 2011. On November 11, 2011, after a preliminary damage assessment that estimated eligible costs at \$27 million, Governor Malloy requested a major disaster declaration, which was granted on November 17. The declaration will make assistance available to local governments for debris removal, infrastructure repair, and mitigation projects.

Governor Malloy added review of the snowstorm outage to the responsibilities of the STORM Panel he established after Hurricane Irene. Many municipal and state government agencies and the utility companies noted that they will review their response capabilities and adjust plans and resource planning in light of the incident.

Additionally, on November 4, Governor Malloy retained the services of Witt Associates to perform an independent assessment of utility companies' response to the snow event. The Connecticut Public Utilities Regulating Authority (PURA) also initiated an investigation of restoration performance in response to both Irene and the snowstorm. The Attorney General's Office called for the investigation to be broadened to include telecommunications and cable services as well. On November 17, CL&P announced several personnel changes, including the resignation of its president and chief operating officer, and the establishment of a position of senior vice president of emergency preparedness.

# IV. Findings and Recommendations

The primary objective of this review is to identify what went well and where improvement is warranted. Where appropriate, we offer recommendations to enhance Connecticut's resiliency for the next significant outage event.

The findings and recommendations listed in this section were developed based on analysis of interviews conducted with more than 65 key personnel (see Appendix A) and through document review (see Appendix B).

Members of the consultant team attended the November 9 Two STORM Panel meeting and reviewed summaries from other meetings of the panel. Findings and recommendations are organized by issue area, generally progressing from preparedness through response (including coordination and communication). A section noting issues outside the scope of this report is found in section IV.H.

Each issue section describes background regarding the issue, a simple statement of findings, and one or more recommendation regarding that finding. Recommendations are numbered for ease of reference for corrective action planning and monitoring.



## A. Preparedness Across All Sectors

**Issue: Preparedness – including planning, training, and exercise – for a widespread power outage and/or infrastructure damage event is inadequate across all sectors.**

**Background:** CL&P underestimated in its planning the potential scale of a worst-case power outage event. This underestimate had ripple effects through CL&P's planning for personnel, equipment, and coordination needs.

CL&P's 2011 Emergency Response

Plan uses a series of five levels, with Level V (the most severe) classified as an extreme event with major system impact at 100,000 or more customers, which is less than 10 percent of CL&P's total

**Figure 4. CL&P Event Classifications from CL&P Emergency Response Plan**

Level	Characteristics	Outages	Expected Duration	Frequency
I	Small Impact Event	<10,000	<12 hours	<75/year
II	Moderate	<20,000	12-24 hours	<25/year
III	Serious	<40,000	24-48 hours	<10/year
IV	Major	<80,000	48-72 hours	<5/year
V	Extreme	>100,000	>72 hours	Once in 5 years

**October 2011 snowstorm event >900,000 outages**

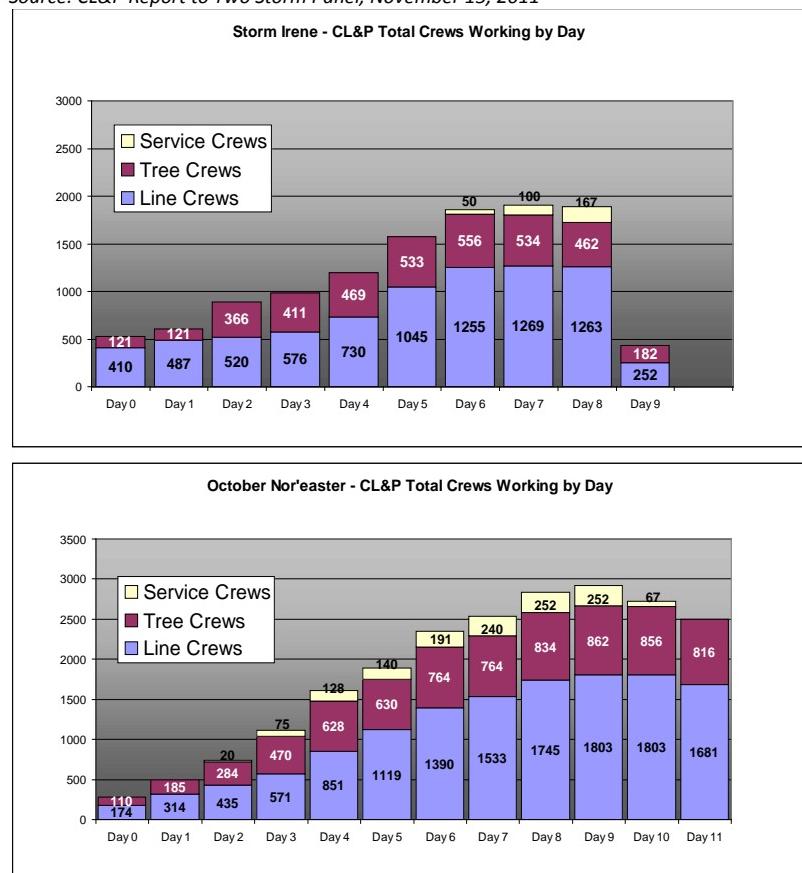
customers, without power and 1800-plus trouble spots. The October 2011 snowstorm exceeded this criteria, resulting in 807,228 users without power at the peak of the outage and more than 25,000 trouble spots. The plan's classification of service outage events matrix seriously underestimates the potential power outage events that could occur, and for which the company should plan.

Both UI and CL&P are members of the Northwest Mutual Assistance Group (NEMAG), and CL&P is also a member of the New York Mutual Assistance Group (NYMAG), which include electricity providers in nearby states that agree to send crews to support each other's restoration efforts, if crews are available, in an emergency. Mutual assistance crews from other states are vital in providing operational capacity for a large-scale restoration effort (see section IV.G below for additional discussion of mutual assistance). The increased capacity is important but requires increased management capability to coordinate efficiently.

After-action reports from several recent large-scale outage events in Connecticut, including the March 2010 severe weather and Hurricane Irene, identified the need for CL&P to increase its management staffing in a large-scale incident to coordinate and manage efforts of the significantly increased workforce. With 10 times more resources to manage than during normal operations, the company had to coordinate staffing and operational levels it had not had the opportunity to exercise.

After the snowstorm, CL&P reported challenges in managing local government expectations related to the role of power company crews in assisting with cut and clear operations. Local jurisdictions that fared better and reported more success in power restoration efforts (at least from the sample interviewed for this report) generally reported that they went into the storm weekend with an aggressive preparedness stance and pre-identified capabilities for damage assessment, tree and road clearing, and debris removal activities.

**Figure 5. CL&P Crew Numbers by Day, Irene and October Snowstorm**  
Source: CL&P Report to Two Storm Panel, November 15, 2011



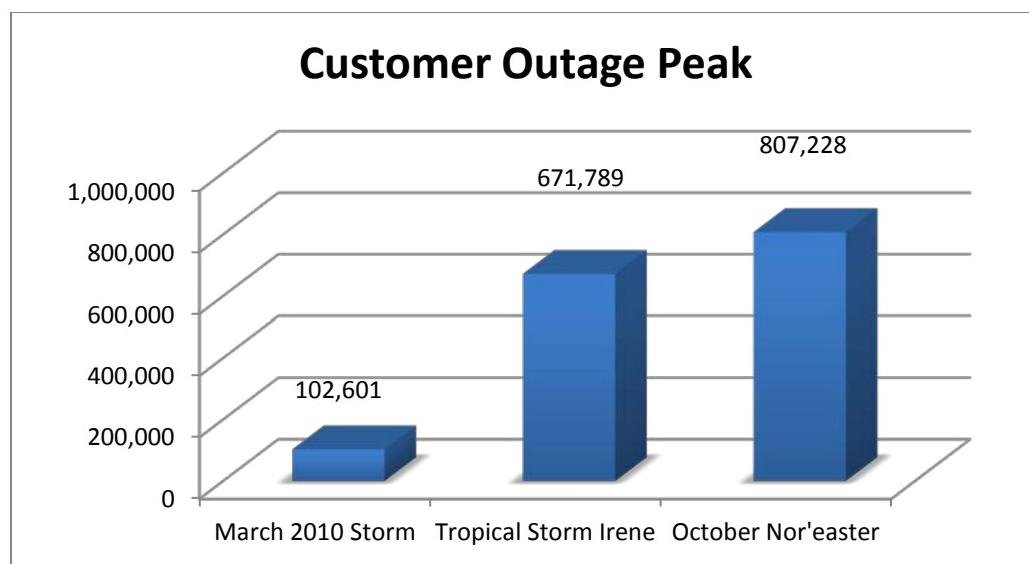
The Connecticut State Response Framework and its Natural Disaster Plan do not specifically address responsibilities or refer to procedures for a power outage incident. The state plans refer to Connecticut October 2011 Snowstorm Power Restoration Findings and Recommendations

Emergency Support Functions, or ESFs, as used in the National Response Framework and federal emergency planning guidance, but the plans do not organize agency activities by ESFs or functional area (such as energy). The state Natural Disaster Plan provides that the Department of Public Utility Control has responsibility for ensuring that utilities have the resources to mobilize maintenance and repair forces.<sup>7</sup> The State Response Framework tasks DPUC similarly and adds keeping the State Emergency Operations Center (SEOC) updated on power disruption and restoration status. The state is developing an Energy Assurance Plan, which is in draft and is scheduled to be completed in 2012. This initiative is led by the Connecticut Office of Policy and Management.

The State DEMHS planning template that guides many municipal emergency response plans likewise does not address major power disruption in detail. The template assigns responsibility for coordination with utilities to the local public works department. It also notes responsibility of utility companies to provide a liaison to local governments, work with the municipal chief executive regarding restoration priorities, and communicate with the municipal executive regarding damage assessments and restoration progress. Utilities and local and state levels of government participate in exercises periodically to test plans, procedures, and equipment and provide practice to personnel with responsibilities in emergency incidents.

**Finding:** CL&P's classification of service outage events provides an inadequate planning scenario to prepare the company for the capability needs, resource coordination, and communication challenges implied by an outage on the scale of the October snowstorm. The plan's maximum Level V (100,000-plus, or 8 percent of all CL&P customers) does not represent viable worst-case outage scenario for a company with 1.2 million customers. (In contrast, the most severe event level described in UI's emergency plan is 250,000-plus, or 71 percent of all customers.)

Figure 6. CL&P Customer Outage Peak, Recent Events



<sup>7</sup> Connecticut Natural Disaster Plan, 2009, p. C-15.

**A.1 Recommendation:** CL&P should review and revise the classification of service outage events planning matrix in its Emergency Response Plan to realistically address small, medium, and large-scale power outage events that could impact the state. Based on the precedents of Hurricane Irene and the October 2011 snowstorm, top level(s) should address outages involving well more than half of all CL&P customers.

**Finding:** While measures to increase management in CL&P had been identified and some implemented, the magnitude and severity of the October 2011 outage challenged CL&P's ability to coordinate and communicate accurate and timely restoration actions. While CL&P brings in additional management staff from across NU on an ad hoc basis during large-scale incidents, the scale of the October snowstorm and the volume of assets required to restore power severely taxed the situational awareness, coordination, and communication capabilities of CL&P's response organization.

**A.2 Recommendation:** CL&P should improve procedures and capabilities to scale up management and coordination capabilities to deal with field staffing levels at seven to 10 times the company's normal field staffing.

**Finding:** CL&P operated under the new revision of its Emergency Response Plan, dated June 2011. The plan uses terminology consistent with the federal National Incident Management System (NIMS), including use of ICS, which is a scalable management structure used in emergency incidents in the United States. ICS is flexible and is utilized for incidents of any type, scope, and complexity. ICS allows its users to adopt an integrated organizational structure that matches the complexities and demands of single or multiple incidents. ICS, when utilized by government, nongovernmental organizations and the private sector, provides a uniform approach with seamless communication between dissimilar organizations. However, the plan does not appear to create a scalable management structure in that it replaces one level of organization with another (district to division to area to system)<sup>8</sup> rather than creating a structure that can expand horizontally with the incident size and maintain a manageable span of control and unity of command at each level of the organizational structure. Such flexibility is a key principle of ICS. Specifically, the plan's mobilization scheme does not provide for transition of authority as an event escalates and is not expandable or easily contractible (four distinct organizations remain mobilized simultaneously). As an event escalates, each subsequent mobilization is layered upon the previous with no clear chain of command among the layers. Key positions are duplicated at each layer (not expanded) during a combined response, which can create confusion as to roles and responsibilities.

**A.3 Recommendation:** CL&P should review and revise its plans and procedures' ability to support scalable incident management during an event and should exercise management scalability as part of its preparedness program. CL&P should implement an ICS training protocol for command staff and general staff and incorporate ICS principles and implementation into drills and participate in multi-agency and multi-jurisdictional exercises utilizing ICS. The company also should inventory and categorize resources by capability to

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<sup>8</sup> See CL&P Emergency Response Plan, Section 4, Emergency Response Organizations

provide for improved identification, request, deployment, and tracking of internal and external resources. The company can explore use of ICS forms or comparable forms to promote consistency in management and documentation of incidents.

**Finding:** NU officials did not provide sufficient organizational/leadership support during this restoration event, allowing a single individual to manage the restoration event, serve as the lead liaison to the State Emergency Operations Center and the Governor, and serve as the public spokesperson. This combination of expectations can create difficulty accomplishing the requirements of each and is not good practice for an organization with resources to spread responsibilities to trained management-level staff. A key tenet of ICS is scalability of incident management; command responsibilities in a major incident include delegating key roles such as public information and government liaison to other qualified individuals.

**A.4 Recommendation:** CL&P should review and adjust plans, procedures, and training as needed to ensure that corporate-level command, public information, and liaison roles are not placed on one person in a large-scale restoration effort.

**Finding:** CL&P has designated personnel responsible for operations and emergency preparedness and response. The CL&P Emergency Response Plan, Section 4, Emergency Management Organizations, references the NU Emergency Operations Group (NU EOG) and CL&P Emergency Management Group (CL&P EMG); the CL&P EMG includes staff of the CL&P Emergency Management Department, and the NU group is composed of two people. It is not clear if and how these groups review preparedness on an ongoing basis and act to provide high-level problem-solving during an incident.

**A.5 Recommendation:** CL&P and its parent company, NU, should establish robust, integrated emergency management leadership capabilities at the executive level. An emergency preparedness and response steering committee or similar body composed of representatives of various components of CL&P and NU should meet regularly to review CL&P's emergency preparedness program and related activities, provide input, and facilitate involvement throughout the organization. Procedures should be developed to define the group's role during an event as that of a crisis management team that will provide CL&P operations a big-picture view and assist with problem-solving, including identifying issues that may harm the organization, its stakeholders, or the general public, and setting overarching incident objectives.

**Finding:** Utilities and local and state governments conduct drills and exercises periodically to practice and test their emergency plans, procedures, and response capabilities, but there is need for joint multi-jurisdictional exercises that address municipal, state, and utility procedures and capabilities for a widespread power outage. Neither CL&P nor UI involve municipal partners in their exercises (although UI has participated in municipal exercises). The CL&P Emergency Response Plan calls for annual storm drills prior to August. While some drills have been held, CL&P did not provide documentation of exercise after-action reports identifying who participated as well as corrective actions and follow-up. After-action reports are standard practice for utilities for both actual events and exercises.

**A.6 Recommendation:** CL&P should create and maintain a robust training, exercise, and corrective action program so that items for improvement are identified in real-world and exercise events, assigned as responsibilities, and monitored for resolution or further action.

**A.7 Recommendation:** Electric utilities and the public sector should work together to establish policies and exercise practices regarding damage assessment, cut-clear, make-safe, and debris removal. State DEMHS regions, Local Emergency Planning Committees (LEPCs), or another regional approach, could be an effective way to approach multi-sector exercises. A regional approach could more easily coordinate with CL&P area organization, which is based on circuits and area work centers (AWCs) rather than municipalities.

**Finding:** CL&P offers training regarding power-line safety, and some (but not all) municipalities reported that local personnel have participated in this. While CL&P District Command is to meet annually with public officials to discuss emergency plans,<sup>9</sup> CL&P has no formal training or education for municipal officials. Municipal officials and crews would benefit from training regarding the basics of the power infrastructure that serves their area.

**A.8 Recommendation:** Electric utilities should regularly train municipal public works personnel, damage assessment teams, and local fire and public safety personnel on utility line identification, live wire identification, and electricity infrastructure and system basics for their areas. Utilities also should provide training and education for municipal leaders on the basic architecture of the power grid and system serving their areas.

**Finding:** Some local governments have well-defined structures and procedures for incident response and management. Others, for varied reasons including staffing levels, resources, and personnel expertise, have minimal processes established for coordinating complex operations, such as designation of a clear point of contact for coordination with utility representatives in a major outage and procedures for damage assessment.

**A.9 Recommendation:** Municipalities should address major power disruption in emergency plans and procedures, including designation of a point of contact to provide clear lines of communication and coordination with utility providers and procedures for damage assessment teams in power and/or utility outage events. CL&P should maintain a list of all 149 municipal points of contact and validate this list on an annual basis (this is standard procedure at UI).

**Finding:** CL&P plans anticipate that the company will receive from municipalities annually a list of critical infrastructure priorities for their jurisdictions. Some municipalities reported meeting regularly, if not always annually, with CL&P representatives and providing them their overall restoration priorities. However, some municipalities do not regularly provide a pre-event restoration priority list. CL&P received detailed damage assessment data from many towns during the 2011 snowstorm but lacked a process to assimilate it into the company's overall damage assessments.

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<sup>9</sup> CL&P Emergency Response Plan (June 2011), Basic Plan, Section 4, Preparedness Activities.

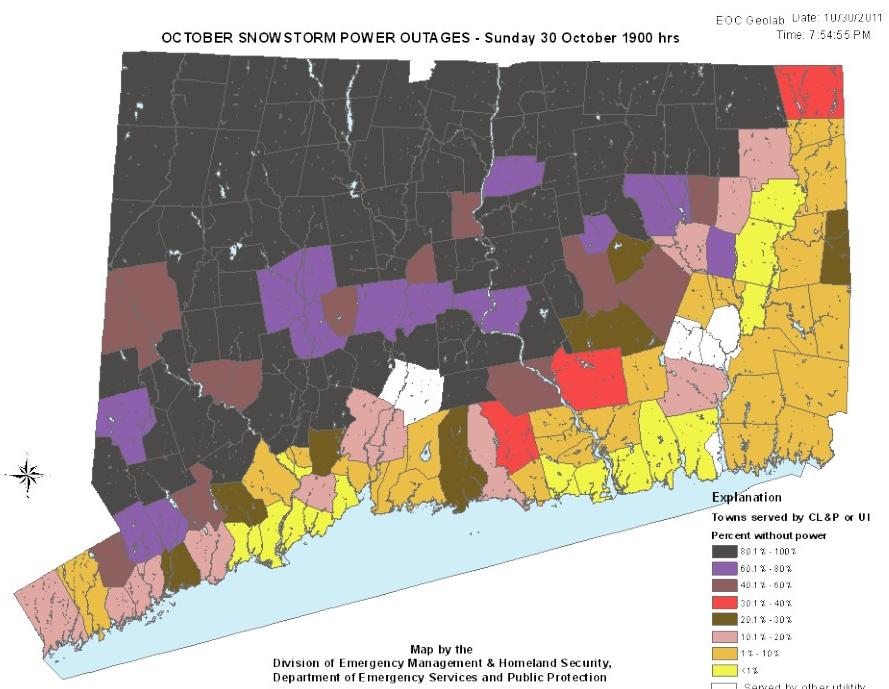
**A.10 Recommendation:** CL&P and municipal governments should establish a regular schedule and process for municipalities to provide and update their pre-identified restoration priority lists. CL&P should update and validate municipal priorities on a regular basis (which is standard procedure at UI). CL&P should also be prepared to explain to municipalities why their priorities may not be addressed exactly as submitted because of the geography of power circuits and utility grid architecture.

**A.11 Recommendation:** CL&P should establish a methodology and tools by which municipalities conduct damage assessments and provide the results to CL&P in a way that CL&P can easily assimilate into its damage assessment process. CL&P should train municipal staff on their damage assessment terminology and information needs and use of CL&P's methodology and tools. This would expand CL&P's damage assessment capabilities, enhance the company's situational awareness, result in a more efficient restoration process, and increase coordination

and trust with municipalities.

**Finding:** Public sector emergency response planning at the state and local levels does not adequately focus on actions needed in a significant power outage and assignment of responsibilities in mitigation, preparedness, response, and recovery in utility disruption events. State and local plans call for reports from power companies but do address multi-agency actions or coordination needed to address energy disruption. State and local plans do not utilize an energy functional area or ESF 12, Energy, to bring organizations together to work on planning, preparedness, capability and resource analysis, and response coordination issues.

Figure 7. Power Outage Map from State EOC, October 30, 2011



**A.12 Recommendation:** Connecticut DEMHS should review and improve state planning for power outage events and play a stronger role in guiding and reviewing municipal plans and procedures for response to power outages, including responsibilities, capability needs, coordination, situational awareness, damage assessment, and debris clearing and removal. The state should incorporate an ESF 12, Energy, into its emergency plan to provide a structure for ongoing multi-agency communication, coordination, and preparedness for

power disruption events. The template provided by DEMHS to municipal offices of emergency management for development of their emergency operations plans also should include an ESF 12 or comparable component to prepare coordinated multi-agency power outage response capabilities.<sup>10</sup>

## B. Readyng for Impact

### **Issue: CL&P did not pre-stage adequate restoration resources in advance of the October 28 snowstorm.**

**Background:** Weather forecasts early in the week of October 24 suggested the potential for an early snow event in the northeastern United States. By Friday morning, forecasters predicted four to eight inches of heavy, wet snow in the northern sections of Connecticut, more in higher elevations, and fewer inches elsewhere in the state. The state DEMHS began tracking weather forecasts and relaying messages to private sector partners and municipalities to prepare for effects of heavy, wet snow on trees with still-significant leaf cover. On Friday, October 28, DEMHS began holding Unified Command calls or meetings, in which CL&P representatives participate, and conference calls with municipalities.

CL&P, too, was monitoring weather forecasts. While the Friday morning forecast warned of the potential impacts of four to eight inches of heavy, wet snow in combination with remaining foliage, CL&P did not pre-stage company crews before the snow began. It housed some contract crews in the area and placed available line crews on call - 134 for Saturday and 146 for Sunday.

CL&P's Emergency Response Plan calls for pre-positioning of CL&P personnel in Level V power emergencies – those with potential for more than 100,000 customer outages. The company contends that it prepared for the size of the storm forecasted, noting that the actual snowstorm exceeded the four to eight inches forecast; however, tree limbs can be expected to fall even with four to eight inches.

Electric distribution companies rely on mutual aid and outside assistance for additional staffing and equipment to restore power following a major storm. In a large-scale outage, CL&P first calls on its own contractors, then seeks help through NU from sister companies, then or simultaneously

**Severe Weather Alert Service From NU's Weather Subscription Service, 6 a.m. forecast, Fri., October 28. 2-3 day outlook:**

"...For CT, northwestern/northern CT could approach the 4-8 inch range as well, with a swath of 2-4 inches over the central/eastern portions of the state, while locations right along the coast should hover in the 1-2 inch range. The highest accumulations will be over grassy areas, trees, and any colder/exposed surfaces. The snow will be wet and heavy for all areas, and is likely to cause problems with tree limbs and power lines. Wind gusts for interior locations with this storm may gust 25-35 mph, while gusts over southeastern CT, as well as eastern NH towards the coast, may range between 30-40 mph."

<sup>10</sup> See Comprehensive Preparedness Guide (CPG) 101, v. 2.0, November 2010; Federal Emergency Management Agency.

requests mutual assistance, and then moves to employ unaffiliated contractors. Mutual assistance is based on agreements among power companies to send crews, upon request and if crews are available, to help another signatory of the agreement with restoration efforts. The company receiving assistance is later sent a bill by each company for the costs of the mutual assistance. Both UI and CL&P are members of the Northeast Mutual Assistance Group (NEMAG), and CL&P is also a member of New York Mutual Assistance Group (NYMAG); these include electricity providers in several northeastern states and Canadian provinces. Mutual assistance also is available from outside the region through a national Edison Electric Institute (EEI) agreement. While CL&P requested significant mutual assistance resources through appropriate channels, some mutual assistance was delayed or denied because of the regional nature of the incident, as utilities in neighboring states were addressing their own outages, and other issues.

On a NEMAG call on Friday morning, no utilities requested mutual aid. On a Saturday morning NEMAG call, although no utilities requested mutual aid there was general recognition that each company would be holding back their own resources in preparation for the approaching storm. By a Saturday afternoon NEMAG call, utilities in several states were requesting assistance and, as a result, found it difficult to secure mutual assistance crews. In its November 15, 2011, report to the Two STORM Panel, CL&P noted that there were 3,505 unmet mutual assistance requests among NEMAG states at the peak of the snowstorm.

CL&P reported that several states held crews rather than release them to go to Connecticut, which is likely at least partially related to the storm's regional potential. CL&P used mutual assistance in Hurricane Irene and had several invoices unpaid from contractors who sent crews because of accounting reviews of charges. The review conducted for this report did not find evidence that outstanding payments impeded the restoration process. CL&P officials said in interviews that the company plans to review its invoice dispute resolution process.

**Finding:** CL&P's decision not to pre-stage CL&P crews and assets before the day of the storm negatively impacted ability to quickly deploy sufficient personnel and equipment for cut-clear, make safe, and restoration activities.

**B.1 Recommendation:** CL&P's Emergency Response Plan and procedures should clarify when and what resources should be considered for pre-staging. For incidents for which there is notice, such as evolving weather forecasts, CL&P should develop a timeline to prompt decisions regarding key steps such as staging or deploying resources, with a time cushion to allow resources to be in place before the first impacts of the hazard are felt, including the capability to account for late changes in forecasts and events that may exceed forecast severity.

**B.2 Recommendation:** In its decision making timeline and ramp-up procedures, CL&P should address considerations to recognize the potential for significant regional impacts and, where indicated, provide triggers to quickly activate EEI mutual assistance requests for out-of-region support.

**B.3 Recommendation:** CL&P should develop and exercise pre-staging procedures and related logistics.

## C. Public Communication

**Issue:** **CL&P developed an internal stretch goal to restore power to 99 percent of all customers by Sunday, November 6. Without internal vetting, the company announced this date as a public performance commitment. This announcement, and the subsequent commitment to restore 99 percent of customers in each of the 149 municipalities it serves, unnecessarily contributed to increased customer frustration and challenges for municipal governments.**

**Background:** Early in the outage, CL&P projected, using models it regularly employs to analyze outage and damage reports, it would have power restored by Wednesday, November 9. However, the company set an internal stretch goal to restore 99 percent of all outages by midnight Sunday, November 6. When this goal was released to the public in media events early in the week after the storm, it was perceived by the public and communities as a promise or deadline for restoration of 99 percent of customers by that date, and this perception was not corrected by the company.

The public statements about the internal goal were made after communication about the goal between CL&P president/chief operating officer, who also served as the company's public spokesperson during the incident, and the Governor.

In subsequent public communications, the 99 percent goal was translated as a projection that 99 percent of each municipality would be restored by the midnight, November 6, deadline. This was a more aggressive target.

The scale of the event created problems for power companies as well as for local public officials. Municipal emergency managers and officials in the hardest affected areas at first relied on the November 6 deadline and other CL&P statements about numbers of crews planned for specific areas on specific dates, as the towns worked to continue key municipal functions and provide public shelter, emergency access, and emergency assistance for their residents, especially the elderly and medically vulnerable. Unrealistic projections and inaccurate predictions of crews working in specific areas complicated municipalities' and residents' ability to plan for continuing to deal with the outage. As the outage continued, some municipalities began to ignore statements from CL&P because they experienced multiple instances of inaccurate statements or what were perceived as broken promises.

NU operates a centralized customer services operation. In large-scale outage events, customer service phone lines often are overwhelmed by those attempting to report and find out information regarding their outage. This was not the case for CL&P in this outage. As a result of investment in new systems, the average wait time for incoming calls during the event was 45 seconds. In addition, CL&P communicates with customers via social media and other options. Unfortunately,

communications, including responses to specific customer inquiries, repeated the 99 percent restoration message.

**Finding:** CL&P's public release of an internal goal of 99 percent restoration by midnight November 6, subsequent statements that the 99 percent goal would apply to each town, and its failure to correct these statements increased planning and coping challenges for municipal governments and customers and created anger among the public. The climate for public and municipal government frustration was likely enhanced by municipal elections scheduled for Tuesday, November 8.

**C.1 Recommendation:** CL&P should develop or review and implement policy for appropriate use and public release of internal restoration projections and targets. The policy should distinguish between internal operational targets and external communications and require that projections for public release be based on proven models and validated by operations components. Policies should apply to public communications staff as well as management and other personnel.

**Finding:** CL&P has significant public communications capabilities and staff. However, in the snowstorm outage, town liaison and corporate communications functions were not aligned in the organizational structure, and public messages and communications activities demonstrated a focus on unity or consistency of message rather than message accuracy.

**C.2 Recommendation:** CL&P should develop written procedures and protocols for verifying and vetting the accuracy and reality of projections and operational details before they are released to the public. This should incorporate policies and training to identify and correct rumors, misinformation, and/or its own misstatements to maintain credibility with customers, public sector partners, and the media.

**C.3 Recommendation:** CL&P corporate communications and emergency preparedness and response should designate qualified and trained individuals, who have an understanding of but do not have other immediate operational roles, to serve as public spokespersons for the company in power restoration and other emergency incidents.

**C.4 Recommendation:** CL&P should create written processes and procedures to ensure flow of information between town liaison and corporate communications functions, so that information can be both (a) strategically collected and vetted from accurate sources, and (b) distributed in a coordinated and effective manner.

## D. Tracking Restoration Progress

**Issue:** CL&P real-time situation awareness of jobs-completed and crew location, progress, and needs was inadequate to properly support coordinated decision-making and accurate communication regarding power restoration activities.

**Background:** CL&P maintains its EOC to coordinate information and operations during an emergency or outage. Crews are given daily assignments each morning. Crews with CL&P technology in their vehicles log jobs completed in real time.

Most crews from outside the state, however, do not have compatible technology to report restoration status as soon as it is completed. In addition, although they have the technology, some internal crews prefer to focus on restoring power and delay status updates until the end of the shift. Because of the need to move on to the next trouble spot, crews working on paper reporting forms complete and submit those at the end of their shift, which can mean a delay of as long as 12 hours before restoration information is logged into the CL&P system. This delay can impact the company's overall understanding of the outage situation, which impacts decision-making regarding resource allocation and priorities. It also can impact the accuracy of information available to liaisons, municipalities and customers.

After-action recommendations from the March 2010 severe weather outbreak included that CL&P consider accelerating programs to provide mobile data terminals in distribution line trucks, or alternatively, providing additional Field Supervisor Lines and Supervisor of Distribution Lines with computers equipped with air cards to "streamline the process of closing work order tickets and enhance the ability of the dispatcher and analysts to effectively and efficiently plan and direct the remaining work efforts"<sup>11</sup>. These recommendations had not been acted on broadly by CL&P by the time of the October snowstorm. CL&P noted in a June 2011 compliance filing with the Department of Public Utility Control that the initiative was not currently funded or considered cost-effective.

CL&P offers a user-friendly outage map on its web site. Although the outage map is updated every 15 minutes, these updates are based on the manual entry methodology described above, and so are not necessarily updated in real time. This can lead to time delays in display of recent outages reported or recent restorations completed and, without explanation of this process accompanying the display, may be confusing to the public. Additionally, at one point during the October 2011 outage, the data breaks that determine what color shows for each percentage level of outage were changed on the CL&P web site, which may have been confusing to customers who had been monitoring the site on previous days.

**Finding:** In the snowstorm restoration effort, CL&P's information management processes did not support timely receipt, analysis, and use of vital information to provide situational awareness for operational decision-making and accurate internal communication with town liaisons and external communication to stakeholders.

**D.1 Recommendation:** CL&P should implement systems and processes to improve real-time situational awareness of trouble spots addressed, crew locations, assignments completed, and related information to provide its EOC with timely information for

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<sup>11</sup> Investigation of the Service Response and Communications of The Connecticut Light and Power Company Following the Outages of the Severe Weather over the Period of March 12 through March 14, 2010 (the Jacobs Report), October 26, 2010, p. 32.

coordinated decision-making and to improve the quality of information the company provides to town liaisons, municipalities, DEMHS, and the public.

**D.2 Recommendation:** Outage and restoration maps made available to the public should include explanation of any delays that impact the timeliness of information displayed on the maps and notation of any data analysis changes that impact the display.

## E. Town Liaison Program

**Issue: CL&P's Town Liaison program had not been fully developed at the time of the snowstorm and was not consistently effective in providing a conduit for accurate information between the company and municipal governments.**

**Background:** CL&P's Town Liaison program evolved in 2010 to address the need to improve communication and coordination between the company and local governments during significant power events. This need was identified in after-action reviews of response to the March 2010 severe weather event. The liaison program is included in the company's June 2011 update of its Emergency Response Plan and was used during Hurricane Irene.

Some liaison training had been accomplished by the time of the storm. CL&P deployed liaisons to 149 municipalities, although some communities initially shared liaisons. Because CL&P had not planned for this scale of outage, personnel tasked with serving as liaisons in some cases had minimal relevant experience and had not been fully trained on their roles, responsibilities, or reporting and communication protocols. Some liaisons did not have working knowledge of the power distribution system and the restoration process. In addition, a number of local officials reported that liaisons did not have prior experience or working relationships with the municipalities they were serving.

In the aftermath of the snowstorm, some hard-hit Connecticut towns experienced frustration with the apparent disconnect between information provided by their liaison and the company's actions. Municipal officials expected their respective Town Liaison to be able to provide accurate and timely information regarding restoration operations specific to their community. While local officials interviewed reported that individuals serving as liaisons did their best and worked hard to carry out their responsibilities, many also noted that the liaison did not seem to have access to the right information and in some cases did not have the necessary context and skills to interpret and communicate restoration operations details.

In some communities, CL&P staff reported that liaisons faced challenges in getting accurate and timely information from their counterparts in restoration operations. Additionally, the organizational structure deployed during the snowstorm response lacked a meaningful mechanism for two-way communication between the liaisons, upper management, and corporate communication.

A number of municipalities reported that their town liaisons were not able to communicate or work remotely with their CL&P counterparts, which, combined with damage review and other activities, meant they often had to be at CL&P or in the field at times when they would have been most valuable in municipalities' operations discussions (e.g., morning incident operations briefings).

**Finding:** CL&P deployed personnel to serve as town liaisons in some cases with little technical training, experience, or previous knowledge of the assigned municipalities to equip them in fulfilling their roles. While liaisons performed the best they could, municipalities identified the need for knowledge and skills that would assist them in understanding CL&P actions and communicating and coordinating with CL&P operations and management.

**E.1 Recommendation:** CL&P should, with input from municipalities, move forward in implementing a comprehensive training program for personnel who may be asked to serve as a Town Liaison. Town liaisons should have the ability to communicate clearly, understand circuit maps, terminology, and basic power restoration practices, and access power company dispatch systems.

**Finding:** CL&P town liaisons in many circumstances had not previously worked or exercised with the municipalities to which they were assigned and so were not familiar with local restoration priorities, personnel, capabilities, plans, procedures, or practices.

**E.2 Recommendation:** The Town Liaison cadre should participate in municipal and regional exercises that address power restoration as part of emergency response (see section IV.A above), both to review and practice restoration responsibilities and to develop understanding of municipalities' and CL&P's respective restoration priorities and operational capabilities and practices.

**Finding:** The company had not yet fully developed the liaison program in terms of incorporating liaison activities into CL&P restoration processes. While municipalities appreciated the concept of the Town Liaison program and praised the effort of the individuals serving as liaisons, they reported that in many cases, priorities shared with their liaison did not seem to affect CL&P activities, and information received from their liaison was inaccurate.

**E.3 Recommendation:** CL&P should review the Town Liaison program, identify the appropriate reporting structure for liaisons, and integrate liaisons into CL&P's procedures and practices for restoration decision-making and activities. To achieve their intended purpose, liaisons must be in a position to be trusted conduits of information from CL&P to the municipalities and from the municipalities to CL&P operations.

**Finding:** While possibly less of an issue in a small-scale outage, providing a Town Liaison to 149 municipalities taxed CL&P's Town Liaison program, resulting in deploying individuals with little or no preparation for the role. Efforts to share liaisons among municipalities were hampered by communication difficulties and liaisons' lack of capability to access and interpret vital CL&P information remotely.

**E.4 Recommendation:** CL&P should review its Town Liaison policies and staffing with municipalities to determine if there are workable ways to effectively share liaisons among municipalities (potentially organized by CL&P's circuits, state regions, or regional planning organizations). This would mean providing appropriate and redundant communications and coordination tools to liaisons so that they can effectively work with both assigned municipalities and the CL&P operations center remotely. This must take into consideration the strong potential for disruption of normal means of communication.

## F. Communications Interoperability

**Issue:** **CL&P crews and public sector response and emergency management entities in Connecticut generally use radio systems for response communication in the field that are not compatible with each other (UHF/VHF versus 800MHz).**

**Background:** Public sector response agencies, including local and state government personnel, use two-way radio systems for communication in the field, which can create challenges in coordinating public and private sector crews working on interdependent activities associated with damage assessment, road clearing, and power restoration. In Connecticut, public-sector staff use 800 MHz radios, which provide flexibility and expandability and are considered the industry standard. CL&P crews also use two-way radios; however, they use UHF/VHF (low frequency) radios.

Although these two radio systems do not work with each other, technology bridges are commercially available to improve interoperability. Connecticut DEMHS stated that the agency had offered to provide state 800 MHz radios to key components of CL&P operations to improve field communications, but CL&P representatives did not accept the offer.

**Finding:** Electric utility company crews and public sector response and emergency management entities in Connecticut often use different radio systems (UHF/VHF versus 800MHz) for response communication. There is minimal capability or procedures identified by CL&P or government agencies in Connecticut to improve radio communication interoperability among public and private sector components of the workforce that need to coordinate closely for the most efficient use of time and resources used for the restoration effort.

**F.1 Recommendation:** As part of statewide communications interoperability efforts, DEMHS should work with CL&P and other utilities to identify and recommend steps to improve communications interoperability across radio systems used by agencies and crews that will be involved in power restoration field operations.

## G. Coordinating Mutual Assistance Assets and Contractors

**Issue:** **While vital to provide needed capabilities, use of external mutual assistance and contract crews presents communication, reporting, and tracking challenges**

**because they often do not have the same communications or field reporting technology as used by local crews.**

**Background:** As noted in section IV. A above, mutual assistance from power companies and contractors in other states are a vital component of large scale power restoration. Both UI and CL&P are members of the NEMAG, and CL&P is also a member of NYMAG. These include electricity providers in several northeastern states and Canadian provinces that agree to send crews to support each other's restoration efforts, if crews are available. CL&P also maintains a roster of contractors, may access contractors via mutual assistance, and may hire contractors during a restoration event. The huge increase in external crews that are brought in to assist, however, can present additional challenges related to management (see section IV.A above) and maintaining situational awareness (see section IV.D above).

CL&P uses a practice it calls "bird-dogging" in which CL&P staff accompany mutual assistance and contract crews to provide more up-to-date reporting on their activities. The volume of mutual assistance and contract crews compared to CL&P bird dogs still presents significant challenges during widespread outages.

**Finding:** Improved capability to capture status of restoration task-completion by mutual assistance crews and contract crews can improve timeliness of report and accuracy of information used for operational decision-making and prioritization.

**G.1 Recommendation:** Utility providers, including CL&P, should implement procedures, and technology, if needed, to improve integration of status reporting by mutual assistance crews into operations reporting and restoration tracking processes.

## H. United Illuminating Findings

The snowstorm was not as large an event for UI as for CL&P in that 52,000 UI customers, about 15 percent of its customer base, lost power. For comparison, in a total service area of approximately 350,000, during Hurricane Irene, UI had a peak of 158,000 customers out and a total of 201,000 outages. After the October snowstorm, all UI customers were restored by the night of Wednesday, November 2. The company reported maintaining good situational awareness throughout this event, though UI staff noted that the situation was much more challenging during Irene.

The company's greatest challenge was providing Estimated Restoration Times for individual towns or customers; the company is confident of its global restoration time model. UI reports having technology initiative in development to improve the granularity of individual forecasts. UI staff noted that in a large-impact event, its restoration organization and operation are able to scale up to respond, but it recognizes that communication with towns gets far more complex and challenging to manage in a larger event.

## **I. Areas for Additional Review**

Several areas of improvement that can impact power outage severity and restoration capabilities were identified that are beyond the scope of this report. They are captured here for additional review and examination.

### **Vegetation Management**

Connecticut's ample tree canopy, while beautiful, tends to increase the likelihood of power outages, given that electricity transmission and distribution infrastructure is primarily above-ground and frequently close to trees in the right-of-way. Utility companies have responsibility for vegetation management in their utility rights-of-way. However, utility companies must seek permission for tree-trimming on trees that are outside their rights-of-way yet may potentially have impacts on infrastructure. Proximity of heavy vegetation to power transmission and distribution lines can contribute to the likelihood of damage to power lines and resulting power outages in high wind, early snowfall, and ice events. While appropriate vegetation management can reduce outages and increase reliability, it can meet public resistance because of aesthetic, environmental, economic (tourism) and other issues.

Utility companies in Connecticut should work with local governments and communities to communicate the benefits of vegetation management both within and proximate to rights-of-way as a means of reducing power outages. Further review of industry best practices regarding vegetation management, including vegetation trimming cycle is recommended.

### **Infrastructure Hardening**

Electricity providers are responsible for the power infrastructure on which residents and economic drivers in Connecticut depend. Utility providers serving Connecticut customers should consider, commit to, and regularly report on planning and investments in infrastructure resilience measures, including vegetation management, equipment and line improvements, and work toward underground placement of conductors and distribution lines.

### **Workforce Issues**

CL&P permanent workforce has decreased over the past few decades, which is part of a national trend that includes greater reliance on contractors and mutual aid. Effects of the reduction in workforce are an issue for future consideration. In addition, the mutual aid system itself should be reviewed.

### **Regulatory Oversight**

CL&P and UI are regulated by PURA and report to PURA, in accordance with state regulations and policy, regarding electricity transmission, distribution, and supply, compliance, and rate issues. PURA should review its regulatory requirements and ability to monitor utility preparedness and restoration capability improvements, including review of mutual assistance agreements and procedures for implementation. PURA, the state Office of Policy and Management, and a state ESF 12 or comparable functional group should be involved in review of restoration efforts and

infrastructure resilience issues and consider addressing issues and lessons from the snowstorm event in the state's ongoing energy assurance planning effort, which is coordinated by the Office of Policy and Management.

### **Other Critical Services**

In addition to electricity, communications also are critical during large-scale outages. The state should review the restoration efforts of major telecommunications providers as well as cable providers upon which Connecticut citizens and businesses are increasingly dependent for voice-over-internet phones and internet services.

## V. Conclusion

This October 2011 Snowstorm Power Restoration Report provides a quick evaluation as a basis for examination of key issues in the restoration effort and improvement planning by the state and by utility providers, particularly CL&P. The short time frame of this evaluation, less than four weeks, beginning before the restoration was complete through the end of November, necessarily limited the depth and breadth of its inquiry. The report provides information and key points for future examination and improvement efforts.

The October snowstorm caused the largest power outage in its history for CL&P, the state's largest electricity provider. While power to 800,000-plus customers was restored in an 11-day period, missteps by the company in terms of public communications added to a sense of frustration with the duration of the outage. Additional challenges were identified in decision-making to prepare for the storm, maintaining situational awareness, securing, and coordinating mutual aid and contract workforce, and coordination with local governments in some hard-hit areas.

Multiple issues and recommendations identified in this report are not new. Issues such as scalability of management for large-scale power outage, the need for improved planning, training and exercise, and coordination with municipalities were identified in after-action reviews of prior outage events. The consultant team recommends an improvement process that is ongoing, monitored, and combined with a commitment to public-private sector cooperation.

Improvements can be addressed on multiple issues through an inclusive planning process and the engraining of emergency plans and procedures in each entity's culture and operations. Plans are best developed with the input of those who will be involved in response. In many cases, it appears that public sector agencies were not involved in the development of CL&P's emergency plans and procedures, and CL&P was not involved in development of state and local government response plans and procedures. Adherence to accepted planning guidance regarding an inclusive planning process that emphasizes ongoing multi-agency involvement in preparedness (such as using Emergency Support Functions to organize responsibilities and preparedness activities) should be considered an improvement measure for the state's DEMHS – both for state plans and DEMHS guidance to local governments. While CL&P shared its new Emergency Response Plan with municipalities, there had been little or no opportunity to exercise the updated plan, which allows for practice of roles and responsibilities, identification of areas for additional resources or training, and work on coordination issues. Emergency response plans should become living documents engrained in the culture of local and state governments and utility providers, through a continuous cycle of exercise, training, and revision, for them to be effective in providing efficient coordination in response.

While state and local government and utility providers cannot prevent severe weather events from occurring, they have the ability and responsibility to address the issues identified in this report.



# Appendices

- Appendix A. Interviews Conducted
- Appendix B. Documents Reviewed
- Appendix C. October 28, 2011, Weather Forecast

## Appendix A. Interviews Conducted

Organization	Participants
<b>CL&amp;P</b>	
Chief Operating Officer	Jeff Butler, President/COO <sup>i</sup>
System Operations	Bob Hybsch, Vice President, Customer Operations Roderick Kalbfleisch; CL&P Director of System Operations
Mutual Assistance Coordinator	Mike Ahearn, Vice President, Utility Services (NU)
Emergency Management Officer	Mike Zuppone, Manager, System Restoration and Emergency Preparedness (NU)
Customer Services Director	Bill Quinlan, Vice President, Customer Solutions
Public Information Officer	Jessica Cain, Director of Customer Relations and Strategy
NU Communications/PR Director	Marie T. Van Luling, Director
NU Customer Experience	Johnny Magwood, VP Customer Experience Dan Comer, Director Kevin Charette, Director
<b>United Illuminating Company</b>	
Restoration operations team	James Cole, Incident Manager Joseph Flach, Incident Manager Charles Eves, Planning Team Lead Al Felice, Restoration Manager
<b>State of Connecticut</b>	
Governor's Office	Timothy F. Bannon, Chief of Staff Roy Occhiogrosso, Senior Advisor to the Governor
Office of the Attorney General	Nora Dannehy, Deputy Attorney General Michael C. Wertheimer, Assistant Attorney General John S. Wright, Assistant Attorney General
Department of Energy and Environmental Protection	Daniel Esty, Commissioner Jonathon Schrag, Deputy Commission for Energy Kevin DelGobbo, Chairman, Public Utility Regulatory Authority (PURA) Robert Klee, Chief of Staff Dennis Schain, Director of Communications

<b>State of Connecticut</b>	
National Guard	Major General Thaddeus Martin, Adjutant General Eugene Mascolo, Assistant Adjutant General
State Department of Emergency Management and Homeland Security	Bill Hackett, Director Brenda Bergeron, Legal Advisor Michael Varney, Statewide Interoperability Coordinator; Scott DeVico, Public Information Officer
Connecticut Department of Public Health Office of Public Health Preparedness	John Best, EMS Field Program Coordinator
<b>Municipalities</b>	
Avon	Brandon Robertson, Town Manager James DiPace, Fire Marshal
Bloomfield	Louie Chapman, Jr., Town Manager Donald Moore, Emergency Management Director
Bristol	Mayor Arthur J. Ward Edward Krawiecki, Corporation Council Walter Beselka, Director of Public Works Robert Longo, Superintendent, Water Department
East Hartford	Marcia Leclerc, Mayor Scott Chadwick, Corporation Counsel Mike Walsh, Director of Finance John Oates, Fire Chief Tim Bockus, Director of Public Works
Fairfield	William Heine, Citizen
Farmington	Kathleen Eagen, Town Manager Russell Arnold, Jr., Director, Public Works/Town Engineer Paul Melanson, Chief of Police Scott Zenke, Highway & Grounds Superintendent, Public Works and Development Services
New Britain	Timothy Stewart, Mayor
Simsbury	Mary Glassman, First Selectwoman Tom Cook, Director of Administrative Services Peter Ingvertsen, Police Chief

<b>Municipalities</b>	
Stafford	Mike Krol, First Selectman Richard Shuck, Selectman-elect Frank Prochaska, Emergency Management Director (EMD) Dennis Milanovich, Town Engineer
Union	Andy Goodhall, First Selectman
Vernon	Jason McCoy, Mayor William Meier, Lt. Vernon Police Department William Graugard, Captain Vernon Fire Department John Ward, Town Administrator
<b>Other</b>	
International Brotherhood of Electrical Workers (IBEW)	Frank Cirillo, John Unikas (Local 420) Brian Kenney (Local 455) John Fernandes (Local 457) Rich Sank (Local 457) Ed Collins (IBEW International Representative)

## **Appendix B. Documents Reviewed**

### **State of Connecticut Agencies**

- Connecticut Department of Emergency Management and Homeland Security, "State-Wide Strategy 2010-2015", (December 2009)
- Connecticut Department of Emergency Management and Homeland Security, "Model Local Emergency Operations Plan", (August 2009)
- Connecticut Department of Emergency Management and Homeland Security, "October Nor'easter Timeline and Summary of State Emergency Operations Center Activities with State Response Framework Reference", (October 2010)
- Connecticut Department of Emergency Management and Homeland Security, "Region One Strategic Plan 2010-2015", (2010)
- Connecticut Department of Emergency Management and Homeland Security, "Snowstorm Power Outages (1 November 12:00 PM)", (November 2011)
- Connecticut Department of Emergency Management and Homeland Security, "Snowstorm Power Outages (1 November 8:00 AM)", (November 2011)
- Connecticut Department of Emergency Management and Homeland Security, "State of Connecticut Natural Disaster Plan 2009", (January 2009)
- Connecticut Department of Emergency Management and Homeland Security, "State Response Framework Ver. 01", (October 2011)
- Connecticut Department of Emergency Management and Homeland Security, "Town/City EOP Template", (2006)
- Connecticut Department of Energy & Environmental Protection, "Special Meeting – Nov. 9, 2011", (November 2011)
- Connecticut Government, "Natural Disaster Plans- Utilities References" (no date)
- Department of Public Utility Control, "DUPC 2011 Annual Report to the General Assembly on Electric Distribution Company System Reliability", (June 2011)
- Department of Public Utility Control' "Investigation of the service response and communications of the Connecticut Light and Power Company (CL&P) and the United Illuminating Company (UI) following the outages from the severe weather over the period of March 12 through March 14, 2010", (December 2010)
- Jonathan Best, State of Connecticut Department of Public Health, Email regarding Public Health response to October Snowstorm, (November 2011)
- Kevin DelGobbo, Email concerning ISO Transmission System Impacts, (November 2011)
- Mike Caplet, Email Containing Video of Meeting on Nov. 15, 2011, (November 2011)
- State of Connecticut Department of Public Health, Appointment document regarding Jonathan Best serving as IC for Department of Public Health for October Nor'easter, (November 2011)
- State of Connecticut Office of Policy Management, "State of Connecticut Energy Assurance Plan", (February 2011)
- State of Connecticut Office of Policy Management, "After Action Report Inter-State Exercise,

- Energy Assurance”, (July 2011)
- STORM Panel, “Special Meeting Agenda Nov. 15, 2011”, (November 2011)
- STORM Panel, “Special Meeting Minutes Tuesday Oct. 25, 2011”, (October 2011)
- STORM Panel, “Special Meeting Minutes Wednesday Sept. 28, 2011”, (September 2011)
- STORM Panel, “STORM Panel Meeting Nov. 9, 2011”, (November 2011)
- STORM Panel, “Special Meeting Notes”, (November 2011)

### **Connecticut Light and Power**

- Connecticut Light and Power, “ Account Executive Safety Information”, (no date)
- Connecticut Light and Power, “ December 1, 2010 Wind Storm”, (2010)
- Connecticut Light and Power, “ December 11- December 16, 2008 Ice Storm Event”, (2008)
- Connecticut Light and Power, “ December 26, 2010 Blizzard”, (2010)
- Connecticut Light and Power, “ December 3, 2009 Wind Storm”, (2009)
- Connecticut Light and Power, “ December 30, 2008 Wind Event”, (2008)
- Connecticut Light and Power, “ Emergency Response Plan”, (June 2011)
- Connecticut Light and Power, “ Explanation of Restoration Projection Model from Sunday”, (November 2011)
- Connecticut Light and Power, “ February 12, 2009 Wind Storm”, (2009)
- Connecticut Light and Power, “ February 2, 2011 Snow and Ice Storm”, (2011)
- Connecticut Light and Power, “ Incoming calls to the EOC”, (no date)
- Connecticut Light and Power, “ January 12, 2011 Snowstorm”, (2011)
- Connecticut Light and Power, “ January 18, 2011 Ice Storm”, (2011)
- Connecticut Light and Power, “ January 7, 2009 Ice and Wind Storm”, (2009)
- Connecticut Light and Power, “ July 21, 2010 Thunderstorm/ Tornadoes”, (2010)
- Connecticut Light and Power, “ Legislative response to Storm Irene”, (October 2011)
- Connecticut Light and Power, “ Legislative Responses to Storm Irene”, (September 2011)
- Connecticut Light and Power, “ March 13, 2010 Rain and Wind Storm”, (2010)
- Connecticut Light and Power, “ Media Book Contents”, (no date)
- Connecticut Light and Power, “ November 8, 2010 Wind Storm”, (2010)
- Connecticut Light and Power, “ October 7, 2009 Wind Storm”, (2009)
- Connecticut Light and Power, “ October Storm Call Summary”, (no date)
- Connecticut Light and Power, “ Presentation to Governor Malloy – State of Connecticut Storm Irene Assessment”, (October 2011)
- Connecticut Light and Power, “ Regarding: Investigation of the Service Response and Communications of CL&P and UI following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010 – Order No. 2 Compliance”, (January 2011)
- Connecticut Light and Power, “ Regarding: Investigation of the Service Response and Communications of CL&P and UI following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010 – Order No. 2 Compliance”, (June 2011)
- Connecticut Light and Power, “ Storm Room Media Log, Example”, (no date)
- Connecticut Light and Power , “ Storm Watch Update” , (August 2011)

- Connecticut Light and Power, "Town Liaison Storm Information", (November 2011)
- Connecticut Light and Power, "Town Liaison Training Attendance Record", (2011)
- Connecticut Light and Power, "Town Liaison Training FAQ's", (November 2011)
- Connecticut Light and Power, "Wires Down Checklist", (no date)
- Connecticut Light and Power, "Wires Down Scenario", (no date)
- Connecticut Light and Power, "Working AWC Boundary Map", (no date)
- Connecticut Light and Power, "Zero Incident Program", (no date)
- Connecticut Light and Power, "2011 Town Liaison Update", (August 2011)
- Connecticut Light and Power, "Accessing Outage Information", (no date)
- Connecticut Light and Power, "April 29, 2010 Rain and Wind Storm", (2010)
- Connecticut Light and Power, "August 28, 2011 Storm Irene", (2011)
- Connecticut Light and Power, "August 28, 2011 Storm Irene", (August 2011)
- Connecticut Light and Power, "Central Division Town Liaison Training Agenda-1", (February 2011)
- Connecticut Light and Power, "Central Division Town Liaison Training Agenda-2", (February 2011)
- Connecticut Light and Power, "CL&P Orientation to Connecticut Legislature", (September 2011)
- Connecticut Light and Power, "CL&P Presentation to the STORM Panel", (November 2011)
- Connecticut Light and Power, "Communications Daily To-Do list, Customized for October Snow Storm", (no date)
- Connecticut Light and Power, "Customer Call Statistics for October Snow Storm", (October-November 2011)
- Connecticut Light and Power, "Customer Experience Technology Performance Data", (no date)
- Connecticut Light and Power, "Customer Interactions Protocol", (no date)
- Connecticut Light and Power, "Customer Out Targets and Crew Assumptions #1", (November 2011)
- Connecticut Light and Power, "Customer Out Targets and Crew Assumptions #2", (November 2011)
- Connecticut Light and Power, "Customer Services Division, Emergency Operating Organization-Manchester", (no date)
- Connecticut Light and Power, "December 29, 2009 Wind Storm", (2009)
- Connecticut Light and Power, "Distribution of News Releases", (April 2011)
- Connecticut Light and Power, "EOC and SOC Contact List", (no date)
- Connecticut Light and Power, "Estimated Time to Restore Methodology for Nov. 6 Deadline", (November 2011)
- Connecticut Light and Power, "Event Management Flow Chart", (October 2011)
- Connecticut Light and Power, "Explanation of CL&P estimated time to restore methodology and calculations leading to initial November 6, 2011 restoration projection for Storm Alfred", (November 2011)
- Connecticut Light and Power, "Explanation of estimated Restoration Projection Process", (November 2011)

- Connecticut Light and Power, "Explanation of methodology for updating data on restorations", (November 2011)
- Connecticut Light and Power, "Explanation of who approved the restoration projection", (November 2011)
- Connecticut Light and Power, "February 19, 2011 Wind Storm", (2011)
- Connecticut Light and Power, "General CGS Guidelines, Tips for Dealing With Difficult Customers", (August 2011)
- Connecticut Light and Power, "General PSA #1", (no date)
- Connecticut Light and Power, "Hurricane Preparations Drill", (August 2011)
- Connecticut Light and Power, "Hurricane Tabletop Exercise Scenario and Discussion Points" (June 2011)
- Connecticut Light and Power, "Internal Communications Update for Storm Alfred", (November 2011)
- Connecticut Light and Power, "January 25, 2010 Wind Storm", (2010)
- Connecticut Light and Power, "July 7, 2009 Thunderstorm", (2009)
- Connecticut Light and Power, "June 26, 2009 Thunderstorm/ Tornado Event", (2009)
- Connecticut Light and Power, "June 8-9, 2011 Thunderstorm", (2011)
- Connecticut Light and Power, "List of Crews Working Nov. 2<sup>nd</sup> – Nov. 10<sup>th</sup>", (November 2011)
- Connecticut Light and Power, "May 26, 2010 Thunderstorm", (2010)
- Connecticut Light and Power, "May 4, 2010 Rain and Wind Storm", (2010)
- Connecticut Light and Power, "May 8, 2010 Rain and Wind Storm", (2010)
- Connecticut Light and Power, "Municipal Liaison Training, Western Division", (January 2011)
- Connecticut Light and Power, "November 28, 2009 Wind Storm", (2009)
- Connecticut Light and Power, "NUNET Power outage map", (November 2011)
- Connecticut Light and Power, "October 25 – October 27, 2008 Thunderstorm Event", (2008)
- Connecticut Light and Power, "October Storm, Customer Experience, Customer Communication Channel Summary", (October-November 2011)
- Connecticut Light and Power, "October Winter Storm Restoration Plan", (November 2011)
- Connecticut Light and Power, "On Call Talking Points, General", (no date)
- Connecticut Light and Power, "On-Call Talking Points, After the Storm", (April 2010)
- Connecticut Light and Power, "On-Call Talking Points, Before the Storm", (April 2010)
- Connecticut Light and Power, "Opening the EOC Media/ Communications Room", (no date)
- Connecticut Light and Power, "Outage Text Messaging" (November 2011)
- Connecticut Light and Power, "Portable Generator Safety Tips", (no date)
- Connecticut Light and Power, "Restoration Performance Charts-Irene and Nor-easter comparison", (November 2011)
- Connecticut Light and Power, "Rule of Thumb Estimate for October Snow Storm", (November 2011)
- Connecticut Light and Power, "September 30, 2010 Wind / Rain Strom", (2010)
- Connecticut Light and Power, "Storm Restoration FAQs", (no date)
- Connecticut Light and Power, "Storm Room Media Log", (no date)

- Connecticut Light and Power, "Storm Watch Update", (October 2011)
- Connecticut Light and Power, "Town Liaison Quick Guide", (July 2011)
- Connecticut Light and Power, "Town Liaison Training", (February 2011)
- Connecticut Light and Power, "Town Liaison Training", (September 2010)
- Connecticut Light and Power, "Town of Stafford Town Restoration Progress Briefing – 11-08-2011 8:00 AM", (November 2011)
- Connecticut Light and Power, "Using the TVs in the Media Room", (no date)
- Connecticut Light and Power, "Wires Down Responsibilities", (no date)
- Connecticut Light and Power, "Working AWC Boundary Map", (no date)
- Connecticut Light and Power, Central Division Training Attendee List Item 2-Simsbury, (February 2011)
- Connecticut Light and Power, Central Division Training Attendee List Item 6-Simsbury, (February 2011)
- Connecticut Light and Power, Contract Regarding "Storm Work", (no date)
- Connecticut Light and Power, Customer Call Center Information Screenshots, (October 2011)
- Connecticut Light and Power, Email explaining the CL&P documents which make up the Communications Plan, (November 2011)
- Connecticut Light and Power, Email response involving Restoration Priorities in Alfred, (November 2011)
- Connecticut Light and Power, Email response regarding the request for a list of Contractors Invoices, Payments and any Problems, (November 2011)
- Connecticut Light and Power, Email Response to document request regarding Auxiliary Manpower Contracts, (November 2011)
- Connecticut Light and Power, Email response to provide CL&P Field Operations Staff History for past 3 years #2, (November 2011)
- Connecticut Light and Power, Email response to provide staffing levels of crews during snowstorm, (November 2011)
- Connecticut Light and Power, Email Response to Question 21,Provide Communications Plan for Storm Alfred, (November 2011)
- Connecticut Light and Power, Email response to Question 7 Provide CLP Field Operations Staff History for past 3 years, (November 2011)
- Connecticut Light and Power, Email response to request for Damage Assessment Plans and Timelines for Storm Alfred, (November 2011)
- Connecticut Light and Power, Email Response to request for documentation regarding Mutual Aid Contracts, (November 2011)
- Connecticut Light and Power, Email Response to request for Irene After-Action Report, (November 2011)
- Connecticut Light and Power, Email response to request for outage restoration training and records, (November 2011)
- Connecticut Light and Power, Email response to request regarding status of implementation of the Jacobs report assessment, (November 2011)

- Connecticut Light and Power, Letter to DPUC concerning restoration after Storm Carl, (August 2011)
- Connecticut Light and Power, Letter to DPUC concerning restoration after Storm Carl, (August 2011)
- Connecticut Light and Power, Letter to DPUC on Aug. 21<sup>st</sup>, 2009 Thunderstorm, (September 2009)
- Connecticut Light and Power, Letter to DPUC on Storm Carl, (September 2010)
- Connecticut Light and Power, List of companies contracted for Alfred, (November 2011)
- Connecticut Light and Power, List of Contractor Invoices and Receipts and Payments, (no date)
- Connecticut Light and Power, List of Crews Working Oct. 29<sup>th</sup> through Nov. 1<sup>st</sup>, (November 2011)
- Connecticut Light and Power, List of Hospitals Located in CL&P Service Area and Services Provided, (November 2011)
- Connecticut Light and Power, List of Mutual Aid Companies, (no date)
- Connecticut Light and Power, Mutual Aid Crew Numbers and Timeline, (November 2011)
- Connecticut Light and Power, Patroller training list, (no date)
- Connecticut Light and Power, Submission of CL&P ERP to DPUC, (November 2011)
- Connecticut Light and Power, Summary of Timeline of Mutual Assistance, (November 2011)
- Connecticut Light and Power, Timeline Summary and Specifics of Mutual Aid For Storm Alfred Requests, (November 2011)
- Connecticut Light and Power, Training Presentation “Eastern division town liaisons”, (February 2011)
- Connecticut Light and Power, Tree Service Contracts, (no date)
- Connecticut Light and Power, Weather Forecast 10-23-2011, (October 2011)
- Connecticut Light and Power, Weather Forecast 10-24-2011, (October 2011)
- Connecticut Light and Power, Weather Forecast 10-25-2011, (October 2011)
- Connecticut Light and Power, Weather Forecast 10-26-2011, (October 2011)
- Connecticut Light and Power, Weather Forecast 10-27-2011, (October 2011)
- Connecticut Light and Power, Weather Forecast 10-28-2011, (October 2011)
- Connecticut Light and Power, Weather Forecast 10-29-2011, (October 2011)
- Connecticut Light and Power, Web workspace training list, (no date)
- Connecticut Light and Power, Wires down training list, (no date)
- Connecticut Light and Power, “July 31, 2009 Thunderstorm”, (2009)

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- Federal Energy Regulatory Commission, “Utility Vegetation Management and Bulk Electricity Report from the Federal Energy Regulatory Commission”, (September 2004)
- United State Department of Energy “Comparison of Past Snow Storms to the October Storm”, (November 2011)
- United States Department of Energy, Information regarding Assistance from Mutual Agreement Crews, (no date)

## **Municipalities**

- City of Bridgeport, "After Action Report June 24, 2010 Tornado", (June 2010)
- New Canaan Office of Emergency Management, "After Action Report for March 2010 Severe Thunderstorm", (March 2010)
- The Town of Fairfield, "The Perfect Strom, Response to Chaos" , (no date)

## **Northeast Mutual Assistance Group**

- Northeast Mutual Assistance Group, "Administrative Guideline Appendix B" (January 2011)
- Northeast Mutual Assistance Group, "Administrative Guideline", (January 2011)
- Northeast Mutual Assistance Group, "Administrative Guidelines", (January 2011)
- Northeast Mutual Assistance Group, "NEMAG Charter", (January 2011)
- Northeast Mutual Assistance Group, Letter to UIC NEMAG Renewal, (April 2011)

## **Northeast Utilities**

- Northeast Utilities, "Interruption Ticket Analysis and Processing", (March 2008)
- Northeast Utilities, " Call Center Briefing Sheet for Windsor Employees", (November 2011)
- Northeast Utilities, " Email Response Management System" (November 2011)
- Northeast Utilities, "Accessing Restoration Projections", (no date)
- Northeast Utilities, "Customer Experience E Operations Emergency Operating Organization-Windsor" (no date)
- Northeast Utilities, "Customer Experience Operations Emergency Operations Procedure-Manchester" (October 2011)
- Northeast Utilities, "Customer Experience Operations Emergency Operations Procedure-Windsor" (August 2011)
- Northeast Utilities, "Damage Assessment Patrols", (September 2010)
- Northeast Utilities, "Incident Response Plan", (January 2011)
- Northeast Utilities, "NU Organization Chart #1", (November 2011)
- Northeast Utilities, "NU Organization Chart #2", (November 2011)
- Northeast Utilities, "NU Organization Chart #3", (November 2011)
- Northeast Utilities, "NU Organization Chart #4", (November 2011)
- Northeast Utilities, "NU Organization Chart Officers #1", (November 2011)
- Northeast Utilities, "NU Organization Chart Officers #2", (November 2011)
- Northeast Utilities, "Primary Connecticut Media for Outages", (no date)

## **The United Illuminating Company**

- The United Illuminating Company, "STORM Panel Meeting", (November 2011)
- The United Illuminating Company Holdings, "Organization Charts" , (October 2011)
- The United Illuminating Company, 'Damage Assessment Plan", (no date)
- The United Illuminating Company, "Actual Damage Assessment Timeline: Snow Storm Alfred", (October 2011)
- The United Illuminating Company, "Line Clearance and Vegetation Management Specification" ,

(June 2008)

- The United Illuminating Company, "Outage Restoration Training Plans and Records", (no date)
- The United Illuminating Compan , "Pre-Storm Working Agreements" (no date)
- The United Illuminating Company, "Storm Communications Plan" (October-November 2011)
- The United Illuminating Compan , "Summary of Storm Assignment Training 2008 to 2011", (no date)
- The United Illuminating Company, "Training Records Redacted", (November 2011)
- The United Illuminating Company , "Wires Down Step Guide", (no date)
- The United Illuminating Company, Email To Witt Associates regarding data request, (November 2011)
- The United Illuminating Company, UI Organizational List (Compiled without aid of an organization chart), (November 2011)
- The United Illuminating Company, UI Phone Directory, (no date)

### **Citizen Input**

- Unsolicited Citizen Email, "How Not to Screw up the CLP Fix", (November 2011)
- Katey Walsh, Citizen Input "S. T. O. R. M.", (November 2011)

### **Notes from Interviews Conducted by Witt Associates**

- Witt Associates, , Notes of Interview with Bill Quinlan and Jessica Cain, Connecticut Light and Power, (November 2011)
- Witt Associates, , Notes of Interview with Connecticut Department of Public Utilities Control, (November 2011)
- Witt Associates, "Witt Associates Review of Storm Alfred Requests for Information", (November 2011)
- Witt Associates, Notes of Interview with Bob Hybsch and Roderick Kalbfleisch Connecticut Light and Power, (November 2011)
- Witt Associates, Notes of Interview with Connecticut Department of Emergency Management and Homeland Security, (November 2011)
- Witt Associates, Notes of Interview with Connecticut National Guard, (November 2011)
- Witt Associates, Notes of Interview with Connecticut Public Health, (November 2011)
- Witt Associates, Notes of Interview with Jeff Butler, Connecticut Light and Power, (November 2011)
- Witt Associates, Notes of Interview with Johnny Magwood, Dan Comer, and Kevin Charette, Northeast Utilities Customer Experience, (November 2011)
- Witt Associates, Notes of Interview with Marie T. Van Luling, Northeast Utilities Communications Director, (November 2011)
- Witt Associates, Notes of Interview with Mike Ahern and Mike Zuppone, Connecticut Light and Power, (November 2011)
- Witt Associates, Notes of Interview with Town of Avon, (November 2011)
- Witt Associates, Notes of Interview with Town of Bloomfield, (November 2011)

- Witt Associates, Notes of Interview with Town of Bristol, (November 2011)
- Witt Associates, Notes of Interview with Town of East Hartford, (November 2011)
- Witt Associates, Notes of Interview with Town of Farmington, (November 2011)
- Witt Associates, Notes of Interview with Town of New Britain, (November 2011)
- Witt Associates, Notes of Interview with Town of Simsbury, (November 2011)
- Witt Associates, Notes of Interview with Town of Stafford, (November 2011)
- Witt Associates, Notes of Interview with Town of Union, (November 2011)
- Witt Associates, Notes of Interview with Town of Vernon, (November 2011)

#### **Other entities**

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- Edison Electric Institute, "Suggested Governing Principles Covering Emergency Assistance Arrangements Between Edison Electric Institute Member Companies" (September 2005)
- Jacobs Consultancy, "Investigation of the Service Response and Communications of the Connecticut Power and Light Company Following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010", (December 2010)
- Jacobs Consultancy, "Investigation of the Service Response and Communications of The United Illuminating Company Following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010", (December 2010)
- Kevin E. McCarthy - OLR, "Tree Trimming Laws and Programs", (September 2011)
- "Lessons Learned: March Nor'easter, Norwalk, CT", (no date)

## Appendix C. Friday, October 28, 2011, 9:45 a.m., Weather Advisory

**WINTER STORM UPDATE**  
Friday October 28, 2011  
9:45 AM

**DEPARTMENT OF EMERGENCY SERVICES AND PUBLIC PROTECTION**

Reuben F. Bradford, Commissioner

**VERY RARE MAJOR WINTER STORM EXPECTED ON SATURDAY...**  
**WINTER STORM WATCHES ISSUED FOR LITCHFIELD, HARTFORD, TOLLAND, WINDHAM AND NORTHERN FAIRFIELD AND NORTHERN NEW HAVEN COUNTIES...**  
**SIGNIFICANT POWER OUTAGES EXPECTED...**

The National Weather Service has issued Winter Storm Watches for much of Connecticut, Southeastern New York, and Central New England for Saturday Afternoon and Saturday night.

The latest computer models are forecasting that a major Winter Storm will impact our area Saturday Afternoon and Saturday night with heavy wet snow across interior Connecticut and a mix of rain and snow at the coast. The latest track forecast for this storm is predicting that a low pressure system will form off the North Carolina Coast Saturday morning and then rapidly intensify as the storm moves Northeast Saturday afternoon. Rain and wet snow are forecast to move into Southern Connecticut around noon on Saturday and changeover to all wet snow by late-afternoon away from the immediate coast. The wet snow is expected to become heavy at times Saturday afternoon and continue into Saturday night before tapering off to flurries before daybreak on Sunday. Total snowfall is expected to be elevation dependant with valleys receiving 4 – 8 inches away from the immediate coast and the higher terrain above 500 – 1000 feet receiving up to 12 inches of heavy wet snow.

The main threat from this storm will be from the heavy wet snow bringing down tree limbs and some whole trees causing a significant number of power outages. A secondary threat from this storm will be from very heavy snow which will result in very poor driving conditions Saturday evening.

The Department of Emergency Services and Public Protection (DESPP) will continue to monitor the latest forecasts and will issue another update at 2:00 PM this afternoon.

**CURRENT STORM TRACK AND SNOWFALL FORECAST**

**CURRENT WATCHES AND WARNINGS**

**STATUS OF THE STATE EMERGENCY OPERATIONS CENTER**

**MONITORING**

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